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RARE EARTH ELEMENTS AS TRACERS OF CHEMICAL TRANSFER PROCESSES IN TROPICAL RAIN FOREST SOILS IN FRENCH GUIANA

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The rare earth elements (REE) have been successfully used in the past to trace weathering and water/rock interaction in lateritic soil systems. In the present study we used the REE to monitor chemical transfer processes in French Guiana along a toposequence within rain forest soils and at the soil/plant interface. This site has been selected because chemical transfer processes in soils and soil/plant systems are highly accelerated under humid tropical climate. Soil, soil water, and vegetation samples have been collected in 5 sampling stations along a toposequence in the Paracou experimental site in Northern French Guiana. The upslope soils were drained by lateral subsurface flow and became progressively waterlogged downslope. Our preliminary results show an enrichment of the heavy REE (HREE, Dy-Lu) from upslope to downslope. This is in contradiction to earlier studies which have suggested that light REE (LREE, La-Sm) are less mobile in soils than HREE. The highest HREE enrichment occurs in soil horizons where soil water logging is most intense. These results suggest that the HREE are preferentially scavenged in waterlogged soils, whereas the LREE remain probably in solution and are thus potentially transferred to surface runoff and vegetation. Soil water and vegetation samples are currently analyzed to verify this hypothesis. With this field approach we expect to identify the mechanisms behind trace metal cycling within the Critical Zone of tropical rain forests and contribute to the evaluation of the vulnerability of these ecosystems to anthropogenic perturbations.